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OFFICE OF STRATEGIC SERVICES
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SUMMARY

1. The total strength of the regular German Flak establishment may be tentatively put at 13,000 heavy guns, 25,000 to 30,000 light and medium guns and approximately 1,000,000 officers and men. This establishment is aided by the Heimatflak, a home guard organization employing the part-time services of 200,000 to 300,000 men.

2. At least three-quarters of the regular flak establishment is stationed in Germany and Western Europe. The major task of this portion of the German Flak is the defense of German cities and industrial installations.

3. These estimates are based upon a preliminary examination of sources available to the OSS. They are not offered as definitive calculations but are designed to lay a foundation for criticism and improvement.

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STRENGTH AND DISPOSITION OF GERMAN ANTI-AIRCRAFT ARTILLERY

I. Introduction

This report is one of several designed to measure the cost to Germany in men and equipment of maintaining protection against Allied air-raids on Germany and occupied Europe. Other reports will deal with the fighter plane strength protecting the continent and with the civilian protection services such as fire protection, first aid and post-raid relief.

II. Sources of Information

Relatively little is known of the strength and internal structure of the German Anti-Aircraft Artillery (Flak). The chief sources of data used in this report are a report of the United States War Department Military Intelligence, German Anti-Aircraft Artillery, February 1943, 2 reports of the British War Office, Recent Developments in Flak Deployment and Flak Organization and Employment, both issued in March 1943, and a report on the Order of Battle of the German Army issued by the War Department in April 1943. Other miscellaneous intelligence from prisoners of war, photographic reconnaissance, and similar sources is found in the Weekly Intelligence Notes on Anti-Aircraft published by the European Theater of Operations, United States Army.

Much of the information in these reports is inconsistent and in the absence of definitive knowledge, the estimates in this report are based on a set of assumptions about the internal structure of the Flak organization and the number of Flak units. These assumptions are set out below. When better data become available the tentative estimates here presented will serve as a base from which revisions may readily be made.

III. German Flak Organization

In order to calculate the total strength of the German Flak, given the information at hand, it is necessary to set up a simplified model of the actual Flak organization. The description of the Flak organization presented below is, therefore, not a comprehensive sketch including all the variations from the norm, but only a description of the most common types of Flak units.

Flak units consist of formations (corps, divisions, brigades, regiments) and units (battalions, batteries). The formations are composed of groups of battalions plus staff and organizational troops. The battalion is the basic tactical unit; it may be used independently or combined to form Flak regiments.

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The battalion is the basic tactical unit. It is composed of Headquarter and staff troops and of gun and searchlight batteries. The amount of equipment and personnel in a battalion depends, therefore, on the types of batteries that it includes.

The battery is the fire unit.

For the purpose of this report, eight types of batteries have been distinguished. The composition of these batteries is shown in table I.

Table I

COMPOSITION OF GERMAN FLAK BATTERIES

Type of Battery	Heavy Guns 75mm-& Over	Medium Guns 37,40, 50mm	Light Guns 20mm	Search-lights	Personnel
1. Heavy battery I	6	-	2	-	200
2. Heavy battery II	6	-	-	-	175
3. Light battery I	-	-	12	4	200
4. Light battery II	-	-	12	-	175
5. Medium battery I	-	9	-	4	200
6. Medium battery II	-	9	-	-	175
7. Light searchlight	4	-	-	12	150
8. Heavy search-light battery	-	-	-	9	200

It must be emphasized that the structure of these battery types is not invariant. The more common variations are the use of four instead of six heavy guns in the heavy batteries and the use of 16 instead of 12 60cm searchlights in the light searchlight battery.

The three main types of battalions are the heavy battalion (three heavy batteries plus headquarter troops), the mixed battalion (three heavy batteries plus two light batteries plus headquarters troops), and the light battalion (three light batteries plus one searchlight battery plus headquarter troops). A number of other types of battalions are, however, given in the Order of Battle of the Germany Army[1], which lists all the identified Flak units by type. Table II gives the assumed organization of each type listed in this report except balloon barrage units and regimental staffs.

IV. Preliminary Estimate of Flak Strength

The Order of Battle of the German Army lists 637 identified Flak units and indicates the type of each. Of these, 54 are regimental staffs and 8 are balloon battalions. Information about the organization of these higher staff groups and balloon battalions

1/ War Department, April, 1943

is still too scanty to justify an estimate of their size, but since the personnel of a regimental staff is small and the number of balloon battalions inconsequential, we shall not go far astray by neglecting these units entirely.

The remaining identified units are all anti-aircraft artillery groups of various kinds. Table II groups these 575 units by type and shows the equipment and personnel per unit of each type, the number of units of each kind as listed in the Order of Battle of the German Army and the total number of guns and men included. Figures on equipment and personnel per unit are OSS estimates. They represent the establishment strength most often associated with each type of unit. On the hypothesis that each unit is at full strength Table II suggests that the 575 identified units include 960,000 officers and men, 13,000 heavy guns, 24,000 light and medium guns and 8,000 searchlights.

As estimates of the total strength of the German Flak, these figures are in error in a number of ways. Fortunately the errors tend to be offsetting, at least in part.

1. Not all Flak units have been identified. The serial numbers of Flak units run from 1 to 1,000.

As indicated above, only 637 have been identified. Of the remaining 363 numbers, many are doubtless blank, but many others undoubtedly represent active units. Insofar, our figures underestimate the size of the German Flak.

2. The hypothesis that all units are at full strength, however, is an error which pulls the other way. Actually some units have probably been disbanded and others are at less than establishment strength.

3. Another error in our figures which tends to overstate Flak strength inheres in our estimate of the composition of the various units. This source of error affects the estimates of guns more than it does the estimate of personnel. We have allowed six heavy guns to each heavy battery. Many heavy gun batteries have only four guns. Had we allowed only four guns to each heavy battery instead of 6, the total number of heavy guns would have been about 9,000 insteady of 13,000. The true figure is, of course, intermediate. Similarly, we assumed that all light batteries contained 12 20mm. guns, unless another type was specified in the Order of Battle of the German Army. Actually many battalions use a "medium" (37 mm.) battery in place of one of the light batteries. Since

there are only nine medium guns to a battery as compared with 12 light guns, the effect of this assumption is to overstate the number of light and medium guns.

The assumption that heavy batteries are always composed of six heavy guns carries with it a tendency towards overstatement of the number of men. If all heavy batteries were included but four guns, the total number of men would be less by 60,000. Actually since only a portion of the heavy batteries are four-gun units, the actual error is smaller. Light and medium batteries have the same number of men according to our information. Variant assumptions about the relative numbers of these types, therefore, do not affect our estimates of personnel.

4. One other possible source of error deserves mention. Some reports, as yet without authoritative confirmation, indicate that the number of men allowed per battery in the estimates of Table II may be too high by as much as one-third. In the absence of additional verification, however, we believe it unwise to credit these reports. The higher figures used in Table II are in fair accord with the estimates of MIS.1/

1/ U.S. War Department, Military Intelligence Service, German Anti-Aircraft Artillery, February 1943

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The estimates of Table II have the merit of presenting of the bases of calculation in the area of anti-aircraft artillery in a schematic form which makes criticism and improvement possible. And since the known sources of error tend to offset each other the actual figures may not misrepresent too greatly the general order of magnitude of the strength of the regular Flak establishment. We may, therefore, profitably compare these estimates with alternative calculations of the German anti-aircraft establishment.

V. Other Estimates of Flak Strength

A. The British War Office Estimate

The British report of March 1943 1/ puts the number of men in the regular Flak at between 900,000 and 1,000,000. To this it adds 200,000 to 300,000 men to account for the Heimatflak, a home guard organization created early in 1942 employing civilian workers and youths to man anti-aircraft on a part-time basis. The same report put the Flak artillery strength at 9,000 heavy guns and 30,000 light guns. Another War Office report of the same month 2/ estimated equipment strength at 12,000 heavy guns, 55,000 light guns and 15,000 searchlights.

1/ Flak Organization and Deployment
2/ Recent Developments in Flak Deployment

The British estimate of personnel strength is virtually the same as that shown in Table II. The number of heavy guns allowed by the British (9,000 in one estimate, 12,000 in the other) is also not very different from our estimate of 13,000. If our estimate is reduced somewhat to allow for 4-gun as well as 6-gun batteries, agreement becomes quite close.

The difference between our estimate and that of the War Office in the number of light guns is, however, significant. A plausible explanation - and partial justification - for the higher British figure is that the Heimatflak, whose outfit is not included in our figures, may be equipped largely with light guns. The figures of Table II should be taken to apply strictly to the regular Flak establishment. The total number of light guns devoted to anti-aircraft defense would have to be raised by enough to outfit the Heimatflak. Since the members of this organization serve only part-time, however, the number of guns needed to equip them is only a fraction of that required for a similar number of regular Flak soldiers. Thus a large unexplained gap exists between our estimate of light and medium guns (24,000) and the higher of the British estimates (55,000). The Heimatflak, however, may well serve to explain most of the difference between our

estimate and the lower British figure (30,000).

The degree of support afforded our estimates by their agreement with British calculations should not be exaggerated. The British estimates are, in all probability, based on much the same data as underlie the figures of Table II. The two sets of estimates are probably not completely independent. Hence many of the same qualifications apply to both.

B. Evidence for 28 German Cities

The Anti-Aircraft Command makes frequent estimates of the defenses of enemy cities based upon photographic reconnaissance. A compilation of these estimates for 28 German cities is presented in Table IV below. The incompleteness of the sample largely restricts the usefulness of the data to the information afforded about the ratio of heavy guns to light guns. The total number of heavy guns discovered in these areas is about 2,100. The total number of light guns discovered is about 2,800; and the total number of searchlights about 1,200.

It is noteworthy that the ratio of light guns to heavy guns is far lower than either of the British estimates and considerably lower than the ratio suggested by Table II. Since the A.A. Command sample, however, includes only the defenses of large cities it may not be representative of total strength. It may

The number of light guns, moreover, is admittedly understated, since it is more difficult to identify light gun positions than heavy gun positions.

VI. Disposition of Flak

To determine the size of the German establishment committed to the defense of rear areas against air attack, we must estimate not merely the size but the disposition of the German Flak. Unfortunately the data now available are not yet sufficient to justify the construction of an independent OSS estimate.

A. A British Estimate

The British War Office has estimated that as of January 1943, about three-fourths of the total Flak strength was deployed in Germany and Western Europe, the rest being used mainly on the Eastern Front and in North Africa. Inasmuch as the Order of Battle of the German Army states that in action in the field a motorized or panzer division is normally supported by a Flak battalion and an infantry division by a Flak battery (a statement which leads to an estimate of less than 50,000 men in the active theaters of operation - Russia and Sicily), the British estimate of seventy-five percent in Germany and Western Europe certainly does not seem high even if allowance is made for additional Flak in rear areas on the Eastern Front and in the

Balkans. Tentatively we may accept the estimate of about 750,000 troops employed in the anti-aircraft artillery in Western Europe, to these we must add 200,000 or more civilians performing part-time duties in the Heimatflak.

B. Plans for Further Work

Knowledge of the disposition of Flak within rear areas is obtained mainly from photographic reconnaissance. In the past the OSS has not attempted to record all reports on the defenses of cities covered by photographs. It is planned to follow this information in the future. As information accumulates it may be possible to build up a more complete picture of the disposition of heavy and light gun positions than we have at present. Of necessity, the data will be incomplete since it is impossible to cover the entire continent in photographs, but we may at least hope to be able to estimate the defenses of the larger cities and defense areas in Germany, France, Italy, and the Low Countries.

Table III presents such data for 28 German cities. The data are for the most part out-of-date, but they are presented as an example of the sort of information available.

Table II - TENTATIVE ESTIMATE OF EQUIPMENT AND PERSONNEL OF IDENTIFIED GERMAN ANTI-AIRCRAFT ARTILLERY UNITS

Identified Units by Type	Assumed Organization	Equipment and Personnel per Unit				Number of units identified	Total Equipment & Personnel by Type of Unit			
		Heavy Guns 75 m & over	Light and Medium Guns under 75 mm	Search-lights	Personnel		Heavy Guns	Light Guns	Searchlights	Perso
1 Regt	5 Mixed Battalions + H.Q.	90	150	40	5,900	73	6,570	10,950	2,920	430,
2 Naval Regt	5 Heavy Battalions + H.Q.	90			3,525	3	270			10,
3 Regt (105mm)	5 Mixed Battalions + H.Q.	90	150	40	5,900	4	360	600	160	23,
4 Regt (40)	5 It. Battalions(40) + H.Q.		135	60	4,150	2	--	270	120	8,3
5 Railway Regt	5 Ry. Battalions + H.Q.	90	150		5,650	3	270	450		16,950
6 Set Regt	5 Searchlight Battalions + H.Q.			135	3,900	6	--	--	810	23,400
7 Mixed Battalions	3 Heavy Batteries(Type 1.) + 2 H batteries(Type 1) +H.Q.	18	30	8	1,150	223	4,014	6,690	1,784	256,450
8 Mixed Battalion(75 mm)	3 Heavy Batteries(Type 1.) + 2 H batteries(Type 1) +H.Q.	18	30	8	1,150	2	36	60	16	2,300
9 Mixed Battalion(105mm)	3 Heavy Batteries(Type 1.) + 2 H batteries(Type 1) +H.Q.	18	30	8	1,150	1	18	30	8	1,150
10 Army Battalion	3 Heavy Batteries(Type 1.) + 2 H batteries(Type1) +H.Q.	18	30	8	1,150	13	234	390	104	1,495
11 Mixed Battalion(9[illegible])	3 Heavy Batteries (Type 1.) + 2 med.batteries(Type 1) + H.Q.	18	14	8	1,150	1	18	24	8	1,150
12 Heavy Battalion	3 Heavy Batteries(Type 2)+ H.Q.	18			675	28	504	--	--	18,900
13 Heavy Battalion(94mm)	3 Heavy Batteries(Type 2)+ H.Q.	18			675	1	18	--	--	675
14 Naval Battalion	3 Heavy Batteries(Type 2)+ H.Q.	18			675	49	882	--	--	33,075
15 Light Battalion	3 Light Batteries(Type 2)+ 1 Searchlight battery(Type 1)		36	12	825	118	--	4,248	1,416	97,350
16 Light Battalion(50mm)	3 Medium Batteries(Type 2) + 1 Searchlight battery(Type2)		27	12	825	2	--	54	24	1,650
17 Light Battalion(40mm)	3 Medium Batteries(Type 2) + 1 Searchlight battery(Type 1)		27	12	825	1		27	12	825
18 Railway Battalion	3 Heavy Batteries(Type 1) + 2 light batteries(Type 2)+ H.Q.	18	30		1,100	6	108	180	--	6,600
19 Railway Heavy Battalion	3 Heavy Batteries(Type2) + H.Q.	18			675	1	18	--	--	675
20 Railway Light Battalion	3 Light Batteries(Type 2)+ H.Q.		36		675	4	--	144	--	2,700
21 Railway Battery	Heavy Battery(Type 1) + H.Q.	6	2		200	4	24	8	--	800
22 Railway Light Battery	Light Battery(Type 2) + H.Q.		12		175	1	--	12	--	175
23 Searchlight Battalion	3 Searchlight Batteries(Type 2) + H.Q.			27	750	29	--	--	783	21,750
TOTALS						575	13,344	24,137	8,169	961,[illegible]

Source: Number and type of units - Order of Battle of German Army
Composition - OSS estimate